No. 133 March 2007

solplan review

the independent journal of energy conservation, building science & construction practice

Inside . . .

Green Roofs 3
Types of Green Roofs 4
Green Buildings, Green Roofs and Homeowner Protection in British Columbia 6
The Centre for the Advancement of Green Roof Technology 7
CHBA Environmental Guidelines. 8
EQuilibrium Healthy Housing Initiative. 10
Technical Research Committee News. 13
Fasteners & Treated Wood; Labelling of Treated Wood; Building Code Clarifications; Foil-Faced Rigid Insulation
EnerChoice Stamp of Approval 15
Energy Answers 16
Window Installation Aids: Beveled Window Seal 17
A Summary of NRC-IRC Housing Activities for 2006. 18

Green Roofs

From the Editor . . .

Building regulations are not static – they need to be updated from time to time to reflect changes in construction practice, new materials and designs, changed societal objectives and improved understanding of fundamental building principles. The major document that impacts all construction and sets the minimum ground rules is the building code.

Code documents by definition are legal documents so that the language in which they are written often is arcane and hard to understand, but must be adhered to by everyone. Since people draft the documents and no-one is perfect, it is possible that the language could create ambiguity and occasionally errors creep in.

Every time the building code gets revised, it forces changes on the construction industry. This means that there is plenty of opportunity for reinterpretation of the regulations. One consequence is that when the code is changed, it generates anxiety. Since builders are ultimately responsible for their product, subject to approval by inspectors - be they municipal, a design professional, or insurance provider - any code change can generate considerable debate about what is meant by it and how best to comply with the new regulations.

Code changes also trigger concerns about the rationale behind the changes and the impact they may have. Underlying the angst of the change is the concern for possible unintended consequences that could manifest themselves some time after the project is built.

The latest changes to the National Building Code - the model code which is adopted by most jurisdictions - has spurred such concerns, especially on the West Coast where rain screen detailing is now mandatory for all buildings, including single family dwellings. Although we know that this is a good construction detail, some have expressed concerns that rain screens are overkill and that the code, which sets out minimum standards, is going beyond minimum standards in making it a mandatory requirement. Some have questioned whether there has been enough research and study to justify the changes introduced.

Most of the time it's not a matter of more research being needed (although that is always beneficial) but a matter of understanding the changes, and how they should be applied, especially if it applies to new details/approaches that may not have been widely used. However, I think there is a bigger issue of communication.

The Canadian code development system operates on a broad-based consensus. A lot of due diligence is done before code changes are drafted and circulated for comment. The change process begins with specific proposals that may be raised by an individual. To move forward the proposals must be justified so the proposals and their justifications are reviewed and, depending on the nature of the proposals, additional research may be done.

There is also an extensive review period after the proposed changes have been drafted and before they are adopted. Most of the time, code authorities have difficulty getting any feedback until a decision is made and cast in stone. I guess it's human nature that it takes a certain type of person who is willing to spend time to go through the draft documents, review them, and make comments. As most people are busy with their own business, they don't bother to review the material until it is released in a final format, at which time the poop hits the fan and the whining starts. Often the changes don't really need a lot of additional research, but rather a more clear explanation and review of their application.

I think the fallout as a result of changes happens because the change is forced – and being creatures of habit, we are happy in our routine and find changes can be a challenge.

Richard Kadulski, Editor.

solplan review
the independent journal of energy conservation, building science & construction practice

Editor-Publisher: Richard Kadulski
Illustrations: Terry Lyster
Contributors: Rob Dumont, John Burrows, Jim Gallagher, Janet Ansell
ISSN: 0828-6574
Date of Issue: April 2007
SOLPLAN REVIEW is published 6 times per year by:
the drawing-room graphic services ltd.
PO Box 86627, North Vancouver, BC V7L 4L2
Tel: 604-689-1841 Fax: 604-689-1841
e-mail: solplan@shaw.ca
Street address:
#204 - 1037 West Broadway
Vancouver, BC V6H 1E3
Publications Mail Agreement No. 40013363

Postage paid in Vancouver, BC.
Return undeliverable Canadian addresses to
PO Box 86627, North Vancouver, BC V7L 4L2
COPYRIGHT 2007 by The Drawing-Room Graphic Services Ltd. All rights reserved.
Reproduction without written permission of the publisher is strictly forbidden. Transgressors who don't take heed note: the fragrance on the job site will not be the result of fresh spring flowers.
A license for photocopying or other reprographic copying can be also be obtained from Access Copyright (Canadian Copyright Licensing Agency, 1 Yonge St., Suite 800, Toronto, ON M5E 1E5).
SUBSCRIPTIONS: In Canada 1 year $51.94 (incl GST) (NB, NS, NF $55.86 includes HST); 2 years $93.28 (incl GST) (NB, NS, NF $100.32 includes HST). USA and other foreign payable in US $ 1 year $56.00, 2 years $102.00.

CHANGE OF ADDRESS: include a mailing label or copy all information off label for faster, accurate processing.
CONTRIBUTIONS: Unsolicited contributions and manuscripts welcome. Include self-addressed pre-stamped mailer if return requested. Publisher not responsible for loss or damage of same.
While every effort is made to provide accurate and complete information, we do not warrant or guarantee the accuracy and completeness of such information.
ADVERTISING POLICY: Publisher's discretion in the acceptance of any advertisement. No endorsement is stated or implied by the publisher.
PRINTED IN CANADA
GST Registration: R105208805
SOLPLAN is a registered trademark of the Drawing-Room Graphic Services Ltd.

Green Roofs

Versions of green roofs have been used around the world for centuries. The interest in sustainable buildings with lower environmental impact has generated a renewed interest in green roofs. The common image we may have is of the turf on the roof of a rural house in Scandinavia, or the goats on the roof of the Coombs market on Vancouver Island. Increasingly, we are seeing them on the roofs of urban buildings. Interest in green building is generating more interest, with some green building programs giving them special credit.

The interest in green roofs has been generated because they can have a significant impact on the performance of a building and the microclimate of a city. Green roofs are engineered roofing systems that incorporate the use of vegetation that make environmental, economic and social contributions to urban areas. Container gardens on roofs, where plants are maintained in pots, are not generally considered as green roofs.

In North America, the benefits of green roof technologies are poorly understood and the market remains immature. In Europe, these technologies are well established, in large measure the direct result of government legislative and financial support. There is a vibrant, multi-million dollar market for green roof products and services in Germany, France, Austria and Switzerland among others. For example, in Germany in 2001 alone, more than 13.5 million square metres of green roofs were built. In North America, many major building materials suppliers are involved with this industry.

However, green roofs are complex. It is not simply a matter of putting down some roofing, throwing some dirt on the roof, and letting nature do its thing. A green roof system is an extension of the existing roof that involves a high quality waterproofing and root repellant system, a drainage system, filter cloth, a lightweight growing medium and plants. Green roof systems may be modular, with drainage layers, filter cloth, growing media and plants already prepared in movable, interlocking grids, or, each component of the system may be installed separately.

Although interest in green roofs in Canada is relatively recent, within the Vancouver area itself about 300 roofs have been identified with some type of vegetation; some of these established as early as 1976.

The City of Toronto is actively promoting green roofs. Their interest can be traced to the city's 2000 Environmental Plan which recommended a strategy to encourage green roofs and rooftop gardens as a way to help reduce stormwater runoff, lower rooftop temperatures, and reduce energy use and air and noise pollution.

Water is stored by the substrate and then taken up by the plants from where it is returned to the atmosphere through transpiration and evaporation. In summer, depending on the plants, depth of the growing medium, and local climatic conditions, green roofs can retain 70-90% of the precipitation that falls on them; in winter they retain between 25-40%. For example, a grass roof with a 4-20 cm (1.6 - 7.9 inch) layer of growing medium can hold 10-15 cm (3.9 - 5.9 inches) of water.

Depending on the size and type of building, a green roof can also provide an amenity space for building users — in effect replacing a yard or patio -- and allow residents to grow fruits, vegetables, and flowers. As well, the green roof can reduce heating and cooling loads on a building. Green roofs on buildings in the centre of a city can help reduce the urban heat island effect, and increase the lifespan of the roofing. Some also help reduce stormwater run off, or at least reduce storm surges, and also increase wildlife habitat in built-up areas.

Coombs Market on Vancouver Island is a retail market that has had a green roof for many yars - and the goats on the roof are a feature of this establishement.

Green roof benefits

Green roofs are energy efficient

Green roofs reduce the energy required to cool a building, leading to significant cost savings. In summer the green roof protects the building from direct solar heat. Air is cooled through evapotranspiration -- a process in which water is lost from soil by evaporation and transpiration from the plants. The mass adoption of green roofs could reduce the "urban heat island," cooling cities during the hot summer months, and reducing the air conditioning required. Field experiments in Ottawa found that a 6-inch extensive green roof reduced heat gains by 95% and heat losses by 26% compared to a reference roof.

Types of Green Roofs

Green roofs typically fall into two categories

1. Extensive Green Roofs:

Low-maintenance horizontally spreading ground-cover plants with a maximum plant height of about 16 – 24 inches are ideal. These are ideal for large flat-roof buildings and apartments, as well as for sloped residential roofs. Alpine-type plants are successful because they are drought-, wind-, frost-, and heat-tolerant--all necessary attributes for green roofs. Other plants include sedums and other succulents, flowering herbs, and certain grasses and mosses.

The plants are planted in 3 to 6 inches of a lightweight growing media. After one year, they do not require watering although annual spring weeding of tree seedlings brought in by birds is needed. Fully saturated weights range from a low of about 10 – 50 lbs/sq. ft, compared to standard river rock ballast which weighs about 12 lbs/sq. ft.

Extensive green roofs can be built on slopes up to 30°, but steeper ones can be installed with raised grids or laths to hold plants and soil media in place.

2. Intensive Green Roofs:

These are fully landscaped rooftop gardens that look like traditional gardens because of a wider variety of plant material used. Architectural details such as waterfalls, ponds, gazebos, etc. are possible. Parks, playgrounds or vegetable gardens are also possible, depending on the loading capacity of the roof and the architectural and plant features that the building owner desires. Maintenance requirements are also more intensive, and of course, these roofs are relatively flat.

Plants and trees are planted in at least 8-12 inches or more of soil, so intensive green roofs require heavier structural support.

In winter, the green roof helps reduce heat loss because of the buffering effect of the added material on the roof.

Green roofs reduce water runoff

During heavy or continuous rain, runoff can overpower stormwater systems and damage waterways and fish habitat. The soil and plants on the green roof absorb the rain, reducing the stormwater runoff into the city system. The impact these will have will depend on the climate in the location, the type of soil and plant material.

In a wet climate, with long continuous periods of rainfall, the impact of a green roof during those times will be limited since the roof will be waterlogged and unable to manage additional water. However, in periods of intermittent rainfall, the storm surges are moderated.

Sound Insulation

Soil, plants and the trapped layer of air can help insulate for sound. Sound waves that are produced by machinery, traffic or airplanes can be absorbed, reflected or deflected. The substrate tends to block lower sound frequencies and the plants block higher frequencies. A green roof with a 5-inch soil layer can reduce sound by 40 decibels; an 8-inch layer can reduce sound by 46-50 decibels.

Green roofs enhance roof durability

Greening the roof provides protection to the roof membrane by reducing the daily temperature changes of the membrane and thus extending its length of performance over time. On a summer day, the temperature of a gravel roof can increase by 25°C (77°F) or more, to between 60-80°C (140 – 176°F). Covered with grass, the temperature of that roof would not rise above 25°C (77°F), thus resulting in energy cost savings. Membranes on green roofs typically last twice as long as those on traditional roofs because the temperature is regulated.

Enhance Air Quality

A green roof will not only absorb heat, decreasing the tendency towards thermal air movement, but will also filter the air moving across it. One square meter (10.76 ft2) of grass can remove about 0.2 kg of airborne particulates from the air every year.

Through the process of photosynthesis, plants convert carbon dioxide, water and sunlight/energy into oxygen and glucose. This cyclical process supplies animals and humans with oxygen and food. 1.5 m2 (16.15 ft2) of uncut grass produces enough oxygen per year to supply one human with their yearly oxygen intake requirement.

A green roof will have a noticeable impact on the heat gain and loss of a building, as well as the humidity, air quality and reflected heat in the surrounding neighbourhood. In conjunction with other green installations, green roofs can play a role in altering the climate of the city as a whole.

Aesthetics

Depending on the scale of the building, and especially in multi-family projects, green roofs can provide amenity space for active recreation or as a passive viewing garden. The aesthetic enhancements can add to the value of a property, as some studies in the US and Britain have shown.

It can also satisfy the aesthetic needs of people looking down upon the roof from adjacent buildings.

Green Roof Liabilities

Although they have positive benefits, green roofs also have some disadvantages.

Structural Loads

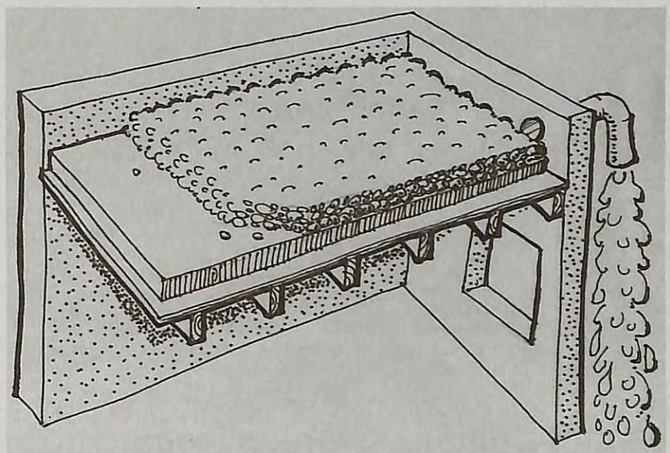
The roof structure needs to be heavier to support the added weight. Although the weight of a 3-inch green roof is approximately equal to gravel ballast used in inverted roof systems, a deeper cover, plus the added weight of absorbed water adds extra weight. Especially for structures with long spans, load considerations will need to be engineered.

Roof Access

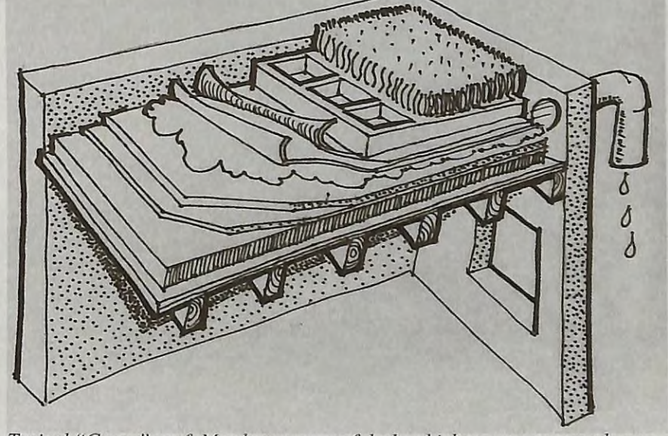
Green roof vegetation is often not designed to be walked on by humans, so it may limit roof access. The installation cost of a green roof is higher than a traditional roof; however, the life-cycle cost is competitive.

Retrofit Limitations

Existing buildings generally cannot be retrofitted to have a green roof because of the weight load requirements for the soil and vegetation. Green roofs also have more exacting standards for the roof system to be installed beneath it, because finding and repairing a leak under 4-12



Conventional "flat" roof. Membrane on roof deck, which may or may not have rigid insulation over top (in inverted membrane roofs) covered by UV protection – typically gravel ballast. Water runoff is immediate.



Typical "Green" roof. Membrane on roof deck, which may or may not have rigid insulation over top (in inverted membrane roofs), with a protection fabric, a root stop membrane, filter cloth and moisture drainage mat, a matrix to contain growing medium and plants. Specific configurations and layers vary with different manufacturers. The green roof slows down water runoff in rainy weather.

Sources of information

www.gvrd.bc.ca/buildsmart/greenroofs.htm
www.greenroofs.net
www.greenroofs.com
www.toronto.ca/greenroofs

inches of soil and vegetation can be an expensive endeavor.

Maintenance Requirements

A green roof requires regular maintenance. To be fair, all roofs require maintenance, but with conventional roofs, when a failure takes places, the roof will leak. With a conventional roof, most of the time the failure should be spotted fairly quickly. In the case of a green roof, because the actual waterproofing is covered with plant material, it can be a magnet for nature. Noxious weeds and even trees with large tap roofs can take hold as seeds are blown onto the roof or distributed by birds. So in order to avoid these plants from taking hold and doing damage does require a regular maintenance schedule.

That is why green roof systems must incorporate a dense inorganic material that inhibits root penetration. It can be polyethylene, a heavy-duty pond liner (EPDM, etc.) or other non-organic element that contains an injected root repellent, such as a copper element. Many North American drainage products bypass a separate root barrier layer and incorporate a root-repellent ingredient in their synthetic filter fabric, placed atop the drainage layer. ☼

Green Buildings, Green Roofs and Homeowner Protection in British Columbia

The interest in green building design to reduce environmental impact has grown exponentially in recent years. By designing buildings to reduce the use of water, energy and materials in construction, operation and demolition, green building technology decreases impacts on solid waste, water, wastewater and stormwater systems as well as the emission of local air contaminants and greenhouse gases.

A high profile design feature of many green buildings is a green roof. By absorbing precipitation on-site, reducing the escape of heat and/or reducing unwanted solar heating in warm weather and providing plant materials that sequester greenhouse gases, green roofs reduce storm water runoff, energy consumption, greenhouse gas emissions and the urban heat island effect.

Application of green roofs has been extensive in Europe but, until recently, rare in North America. To date, green roofs in BC have been limited to industrial, commercial and institutional buildings. In these cases, there is usually a single corporate or institutional owner involved in the design and construction phases who can assess any risks arising from the use of green roof technology and ensure that design, construction, operations and maintenance activities are such that the risk is properly managed.

Local government interest in green roofs is growing due to their perceived benefits for municipal infrastructure in reducing storm water flows. This has generated pressure to apply green roof technology to residential developments, including large, multi-family condominium projects. At least one municipality on the West Coast has stated its intention to mandate green roofs on all new industrial or commercial development above a certain size.

This interest has got the attention of home warranty insurance providers who suddenly have raised concerns, seemingly unaware that green roofs are not a new or unique technology. However, because all homes and common condominium property built in BC must be covered by home warranty insurance, provided by four private companies, there is a real concern whether or not projects with green roofs will be accepted for home warranty coverage. Thus there is the potential for municipalities to mandate green roofs on residential buildings that can't be built because of the unavailability of home warranty insurance.

The decision as to whether a particular builder or project is to be accepted for home warranty insurance is a private one made by the individual insurer. At this time, two of the warranty providers in BC are not prepared to provide home warranty insurance for residential projects involving green roofs at all and two are only willing to do so in very specific circumstances. The hesitation on the part of the insurance companies, and some developers, is the memory of the recent building envelope failures in the past. Questions are raised every time a new and alternative technology is proposed, in an attempt to anticipate and avoid a potential new systemic failure of the roof components of residential buildings similar to the "leaky condo" disaster. No one wants another systemic failure.

The BC Homeowner Protection Office, as the organization established to prevent the recurrence of events of this sort of problem, has a vital interest in ensuring the all relevant issues are resolved before green roof technology is mandated or even voluntarily applied in a residential context. They have identified a number of questions to resolve the issues surrounding the introduction of green building techniques--particularly green roof systems-- in residential construction in British Columbia. These include:

- what specific problems have been identified with green roof design, installation and maintenance that have prompted uncertainty on the part of insurers?
- are there examples of green roof technology being used in climatic zones similar to the coast of British Columbia? If so, what is their experience?
- is there evidence comparing the durability of green roofs vs. conventional roof systems in a climate such as British Columbia's?
- have these other jurisdictions conducted cost/benefit analysis that includes the long-term maintenance and lifecycle replacement costs?
- is there a business case specific to coastal British Columbia that shows a positive cost- benefit relationship for green roofs on a life-cycle basis that is superior to more conventional roof systems?
- do the manufacturers of green roof systems offer warranties that would reduce the risk of green roofs from a home warranty insurance perspective?
- are there best practices in installing and maintaining green roofs that can be prescribed?
- are the skills available in sufficient quantity to construct and maintain green roof systems? If not, what education and training is needed and for whom?

Given the amount of activity in the green roof field and the number of manufacturers that are providing system components, it could be that we are seeing anxiety of the unknown rather than any intrinsic fault with green roofs. Even within the Vancouver area itself there are several hundred green roofs, some of which have been in place for more than 30 years. Two high profile examples are the Vancouver City Archives building and the main undergraduate library at the University of BC – both buildings that require special indoor conditions to protect their collections -- which have been in operation successfully since their completion in the early 1970s.

The Home Owner Protection Office will be sponsoring a workshop to review this issue, and hopefully put to rest any concerns about green roof technology. ☼

Green Buildings, Green Roofs and Homeowner Protection in British Columbia. Homeowner Protection Office – January 2007

The Centre for the Advancement of Green Roof Technology

The BC Institute of Technology has established the Centre for the Advancement of Green Roof Technology (CAGRT). It has become the hub for the green roof industry in the Vancouver area, conducting product performance testing and providing demonstration roofs.

The research centre provides a resource centre for the academic, design, and construction community to advance green roof technology. They focus on extensive green roof systems, seeking solutions for the widespread application of lightweight, affordable, low maintenance roofs that offer environmental solutions. Students from BCIT (building science, architecture, environmental science, engineering technology and trades programs), regional universities and institutes are involved in various research projects based on their area of study.

CAGRT relies on industry, to provide direction on education, policy mechanisms, commercialization of the Roofing Evaluation Module (REM), and for the Regional Infrastructure Network of green roof projects.

Information: www.greenroof.bcit.ca

CHBA Environmental Guidelines

At its winter meeting in Charlevoix, Quebec, the CHBA Board approved new environmental guidelines. The intent is to provide clarity and guidance to CHBA at all levels and to its members on positions and actions to be considered with respect to environmental issues in housing. In addition, it also provides positions and actions that CHBA's new homebuilder, renovator and developer members can take.

The guidelines are based on the belief of the environmental and business benefits of pursuing environmentally sensitive housing, and are compatible with the CHBA Member Builder's Statement of Business Values and Commitments.

The environmental benefits are self-evident. Business benefits include the following:

- Potential efficiency gains from business practices that reduce energy and resource consumption.
- Competitive advantage for those businesses that adopt and implement environmentally sensitive business and construction practices. This advantage accrues for several reasons including the following:
- Increasing consumer expectations for products that are environmentally responsible.
- Superior corporate reputation.
- Superior ability to recruit and retain employees because of growing interest by employees in working for employers who care about the environment, which in turn results in greater company productivity.

The guidelines include an understanding that environmentally responsible housing includes the following attributes:

- Improved energy efficiency.
- Improved resource efficiency.
- Reduced environmental impacts.
- Healthier indoor environments.
- Improved economic viability.
- Improved affordability for consumers.

Guidelines For New Home Builders, Renovators And Developers

Participate in Environmental Housing Programs

Member new homebuilders, renovators and developers are encouraged to participate in environmental housing programs, including the R-2000 Program, EnerGuide for Houses, and other responsible programs such as Built Green where they are available. Member new homebuilders are also encouraged to participate in the EnviroHome Initiative which supports R-2000.

Upgrade the Environmental Performance of Housing

Whether or not new homebuilders, renovators and developers participate in one or more environmental housing programs, they are encouraged to upgrade the environmental performance of the housing they produce. This means increasing the energy and resource efficiency, reducing the environmental impact on their housing products, maintaining a healthy indoor environment, and using cost-effective techniques to retain the affordability of these improvements.

Some examples of specific actions that should be considered include:

- Create house designs that minimize construction waste.
- Build well-insulated and airtight building envelopes to reduce energy losses, using a variety of proven construction details. This includes proper ventilation.
- Adopt durable construction methods to reduce the need for replacement and consequent construction waste. This includes selecting materials and using construction techniques that are durable, including methods to manage moisture.
- Use advanced framing techniques to reduce material consumption and also improve the insulation value of walls.
- Use products that include recycled materials to reduce the environmental impact of construction and to reduce the waste stream.
- Purchase third-party certified sustainable materials for construction purposes to reduce environmental impact.
- Use engineered products (e.g., engineered floor joists) to reduce environmental impact and reduce waste.
- Use Energy Star-rated home appliances, heating, cooling and ventilating equipment, lighting fixtures, windows and doors.
- Use solar and geothermal heating, and wind and photovoltaic electricity generating techniques to reduce consumption of fuels that produce greenhouse gases.
- Use automated lighting controls and compact fluorescent lighting to reduce electricity load.
- Use high-quality filters or alternative features on the HVAC system to provide clean air and improve the indoor environment.
- Use active heat or energy recovery ventilators to reduce energy losses as a result of ventilation.
- Select materials that have no or low rates of emission of harmful gases.
- Participate in construction waste management programs.
- Provide a facility within the dwelling that encourages occupants to recycle materials; also provide a composter.
- Provide plumbing fixtures that use lesser amounts of water.
- Provide landscaping that requires less water or provide information on this type of landscaping to customers.
- Develop community or project designs that utilize land efficiently, and include efficient transportation layouts and community energy and wastewater systems where this is cost- effective.
- Preserve natural habitats in land development projects.
- Develop brownfield sites where the risks are manageable.

Upgrade Proficiency in the Construction of Environmentally Responsible Housing

- Provide education opportunities for staff to increase their knowledge and ability to construct environmentally responsible housing.
- Work with trade contractors and suppliers on practices that can improve the environmental performance of houses.

Upgrade Business Practices to Make Them More Environmentally Responsible

- Use office facilities that are energy efficient, or develop or modify them to make them more energy efficient.
- Use vehicles that are energy efficient.
- Adopt operating procedures that are energy and resource efficient, e.g., electronic communications between staff that save paper.

Communication and Marketing Efforts

- Promote environmental housing to consumers.
- Communicate the environmental measures and achievements through company marketing efforts.

EQuilibrium Healthy Housing Initiative
(aka Net Zero Energy Healthy Housing)

Twelve Canadian homebuilder teams have been selected as winners of Canada Mortgage and Housing Corporation's (CMHC) EQuilibrium sustainable housing competition. (The EQuilibrium brand replaces the previous working name for this initiative, Net Zero Energy Healthy Housing. The name EQuilibrium was chosen to reflect the goal of balancing our housing needs with those of the environment.)

Each winning team will receive $50,000 from CMHC to offset eligible costs, including those relating to documenting the projects, performance testing, and demonstrating the homes publicly. In addition, CMHC will work with the winning teams to provide technical and promotional support, and will monitor and report on the performance of the houses.

The winning projects were chosen by independent housing experts from a total of 72 homebuilder teams that submitted applications in July 2006 through a two-stage competitive process. The demonstration homes will be open to Canadians to view by 2008, after which CMHC will explore opportunities to advance EQuilibrium housing principles more broadly across the housing industry.

The goal of the EQuilibrium initiative is to integrate innovative "green" residential building technologies and, eventually, community development principles in a unique, comprehensive way to significantly improve the performance of housing. EQuilibrium brings together the principles of occupant health and comfort, energy efficiency, renewable energy production, resource and water conservation, and reduced environmental impact.

Canada Mortgage and Housing Corporation (CMHC) is leading the EQuilibrium housing initiative along with key stakeholders which include other federal departments, members of Canada's housing and renewable energy industry, homebuilders and developers, utilities, manufacturers, architects, and other housing experts. Through the EQuilibrium initiative, CMHC's goal is to mobilize partners to advance new sustainable housing solutions for healthy communities and a clean-energy future.

EQuilibrium housing combines energy-efficient design with renewable energy systems to minimize energy consumption and reduce environmental impact. It is designed to lower homeowners' energy bills by reducing energy consumption and delivering electricity back to the grid. The homes will also promote water conservation, healthy indoor environments, durability, and reduced pollutant emissions.

In the early 1990s CMHC organized the national Healthy Housing™ design competition that led to demonstration homes being built in Vancouver and Toronto. The cornerstone design principles of Healthy Housing™ are occupant comfort, energy efficiency, resource conservation, environmental impact, and affordability. Features of the Healthy House™ include passive solar design, solar panels that capture solar energy to power the home, and cisterns to collect rainwater for non-potable uses such as flushing toilets and gardening.

EcoCité-Sodero — Verdun, Québec

The "Abondance Montréal" will be built in Verdun, Quebec. The project is a triplex using a design that, among other things, will draw energy from several sources including a GeoExchange heat pump system, photovoltaic panels, and solar thermal vacuum tubes. It features toilets that run on captured rainwater conserving water and reducing the demand on city sewers by 75 per cent. The triplex will boast a total of 84 solar panels. The suites have been designed in great detail to maximize solar penetration — for example, the refrigerator is located in a spot where it does not cast a shadow on the kitchen counter.

Cheryl Gladu
c.gladu@ecocite.ca

Alouette Homes — Eastman, Québec

The Alouette Homes EQuilibrium Initiative home will be built in Eastman, Quebec. Its design combines readily-available commercially proven renewable energy technologies with energy-efficient construction techniques. The design focuses on using factory pre-engineered modular sections to reduce environmental impact at a rural building site. The home will be connected to the electrical grid using a net-metering system, allowing the eventual owner to "sell" excess electricity generated by the home's photovoltaic system to the grid. Space heating will be provided by a combination of innovative strategies. The rural setting means all the home's water systems are completely self-contained.

Bradley Berneche
brad.berneche@alouettehomes.com

Team Montréal Zero — Hudson, Québec

"EQuilibrium #1" is a single-family, detached house to be located in Hudson, Quebec. The proposed house will have a very airtight and well-insulated building envelope combined with extensive passive heating and cooling techniques, such as large south-facing windows, sunscreens and natural sources of shade. During the winter, heat will be supplied through an air-to-water heat pump, which extracts heat from an array of solar panels and stores it in a water reservoir. The heated water can then be distributed throughout the house with an in-floor radiant system. The air to water heat pump can also be used to heat the home's hot water tank whenever required.

In order to ensure air quality, careful consideration will be given to design and construction techniques that protect and enhance the indoor environment. A large portion of the site will remain undisturbed and act as a natural wildlife habitat.

Sevag Pogharian
sevag@spd.ca

Sustainable Urbanism Initiative — Toronto, Ontario

Sustainable Urbanism Initiatives's "Davenport Townhouses" proposal is for three townhouses located in Toronto's downtown Annex area. The townhouses will incorporate energy-efficient features such as spectrally selective window glazing. They will also showcase ground source heat pumps powered by electricity generated through photovoltaic cells placed on the roof of each unit. The fact that the townhouses will be located in a part of town well-served by transit highlights two sustainable urban design imperatives — reducing dependence on the automobile, and efficient use of existing infrastructure.

Lou Ampas
ampas@ampas.ca

Minto — Ottawa, Ontario

Minto's Manotick House will be located in the south-end of Ottawa. One of the most important features of the house is the high level of insulation in the building envelope including double-wall construction with strategically located triple-pane windows. The design, based on a typical Minto development design, incorporates several innovations, one of which is an "all-off" switch — it not only turns off all lights, but all computers, cable boxes, amplifiers, etc. so that when the homeowners leave home, they can be confident that a minimal amount of energy is being used.

Andrew Pride
apride@minto.com

Now House™ — Toronto, Ontario

Now House™ will take an existing 60-year-old post-World War II house in Toronto and retrofit it to meet EQuilibrium's goals. Insulation upgrades, new windows, Energy Star appliances, wastewater heat recovery, and solar panels are some of the ways the house's energy usage footprint and greenhouse gas emissions will be reduced. The larger goal of this plan is to demonstrate how homeowners and their local contractors can improve energy efficiency of older housing with a few simple but innovative modifications that could meet – or surpass – the very highest EQuilibrium housing standards.

Lorraine Gauthier
lorraine@workworthdoing.com

Avalon Master Builder — Red Deer, Alberta

"Discovery III" is the name of Avalon Master Builder's EQuilibrium submission. This grid-tied solar home, to be built in Red Deer, Alberta, will produce as much energy as it uses annually. It will also feature a grey-water recycling system to reduce the home's reliance on the municipal water system. To boost the home's overall resource efficiency, its innovative wall and window systems will reduce space-heating requirements. The home will also use solar systems to preheat air and water. The design builds on Avalon's ongoing work to deliver resource-efficient homes to customers.

Ryan Scott
ryan@avalonmasterbuilder.com

Canadian Housing Energy Sustainable Solutions (CHESS) — Red Deer, Alberta

CHESS' "EQuilibrium Concept Home" is customized for Central Alberta's climate - specifically, that of Red Deer, Alberta. It pays close attention to the issue of resource efficiency. Not only will 65 per cent of the construction waste generated by the home be recycled, but many of the materials used to build it can be re-used when the home is eventually demolished. The home is also intended to evolve with the owner's needs. For example, an optional second floor can be developed to accommodate a growing family. Later in life, the main floor can easily be adapted to be barrier-free. To ensure the home would produce as much energy as it consumes on an annual basis, the builders combined a highly efficient building envelope with geothermal, solar thermal and solar PV renewable power sources.

Gayle Wood
gwood@laebon.com

Echo-Logic Land Corporation — Calgary, Alberta

Echo-Logic describes its "Echo Haven" project as "the next step" in the demonstration of energy-efficient, healthy, low-impact housing on a community scale. The project is part of a 25-home community in Calgary. It includes features such as a greenhouse and a community building with guest accommodation and a work-at-home office. The design of the homes will demonstrate healthy and durable materials, rainwater harvesting, composting or low-flush toilets and site-sensitive orientation to maximize both solar exposure and integration with surrounding nature.

To minimize energy requirements, all residents of the community will share a variety of on-site renewable energy systems, including a grid-tied PV array, several small wind turbines as well as solar hot water heating. In addition, the lots and houses will be laid out to maximize both solar exposure and the integration of the community into the natural surroundings.

David Spencer
david.spencer@stantec.com

Habitat Studio & Workshop Ltd. — Edmonton, Alberta

The goal of Habitat's Riverdale project is to prove that it is possible to build houses that foster a high quality of life while also reducing greenhouse gas production and environmental impact. "Riverdale" involves the construction of an EQuilibrium-compliant energy duplex in downtown Edmonton, that will produce as much energy as it consumes through a combination of rigorous energy conservation, energy efficiency measures and the use of renewable energy sources. The materials used to build the home will include regionally-produced lumber and recycled newspaper.

Gordon Howell
ghowell@hme.ca

Nexus Solar Corporation — North Battleford, Saskatchewan

The Nexus Solar and Battlefords Tribal Council project "YIPI!" will be located in North Battleford, Saskatchewan. (YIPI! stands for Yellowhead Innovation Park Inc.) The project will take advantage of Saskatchewan's sunny climate for solar power. Its healthy features include the use of low-toxicity construction materials. Nexus has also incorporated innovative refrigeration and clothes drying technologies into the YIPI! Project, as well as factory-built construction that will ensure consistently high quality, affordability, and easy on-line ordering. To help increase consumer awareness of EQuilibrium design objectives, Nexus will locate the project next to a major highway.

Teresa Jeannine Paul
jpaul@nexussolar.com

Winnipeg Housing Rehabilitation Corporation — Winnipeg, Manitoba

The Corporation's "Urban Ecology" design will build a semi-detached, environmentally-friendly development in an inner-city Winnipeg neighbourhood. The two units in the development will be fully adapted to Winnipeg's climate. This will include a combination of flat and pitched roofs so the photovoltaic system powering them can be snow-free in winter. The team is confident that high-efficiency appliances, low-flow fixtures and sustainable building materials present in the design make "Urban Ecology" an attractive and successful as well as affordable demonstration project.

Stephanie Noga
snoga@whrc.ca

Technical Research Committee News

Fasteners & Treated Wood

Wood treatment continues to present a problem for the building industry. The Canadian Wood Council convened a meeting of all affected parties in January to review the concerns. They will be revising their website (www.cwc.ca) to provide updated information. Further research work is ongoing to determine the cause and remedy for the premature deterioration of fasteners that was identified in a study done by the Homeowner Protection Office of BC.

The recommendation is that when using treated wood, builders should use stainless steel fasteners and connectors especially in coastal areas in exposed areas and post-dipped galvanized connectors in other climates. CHBA is encouraging the treated wood industry to take steps to deal with the problems identified and also to communicate the concerns and solutions more effectively.

Labeling of Treated Wood

The 2005 National Building Code has a clause requiring that treated wood must be appropriately labeled for use in some applications. Unfortunately, the treatment industry has not kept up with the pace of regulatory changes, and has not fully implemented a labeling program. CHBA has alerted provincial associations about the potential supply problems of appropriately labeled treated wood as required by the 2005 NBC. The Provincial/Territorial Advisory Code Committee has also alerted provincial governments of the potential problem in coastal areas. Information at this time is that at leeast in the Atlantic region the requirement will likely be deferred.

Building Code Clarifications

With the introduction of the revised National Building Code, it appears that a few provisions were drafted with questionable wording which has created confusion.

Capillary Break Rain Screen Requirement

Section 9.27.2 (Required Protection from Precipitation) requires that exterior claddings on a building must provide protection for materials within the wall, and must prevent water moisture ingress into a wall. It requires that exterior wall exposed to precipitation must have two planes of protection. The first plane of protection typically is the cladding material, and the second is the sheathing membrane behind the cladding. In areas with high moisture exposure, defined by a new moisture index, which is a calculated number that provides an indication of the moisture loading on a building, a rain screen, with a minimum 10 mm capillary break is required.

Vinyl Siding and the Capillary Break Rain Screen Requirement

In coastal BC, and a few other parts of Canada around the Great Lakes and on the Atlantic coast, the code now requires a full rain screen, minimum 10 mm thick. The code has also stated that some materials that do not absorb moisture and that are installed loosely, and that have a space behind them, such as uninsulated horizontal vinyl and aluminum siding, qualify as acceptable rain screens. The code has spelled out dimensions of a typical horizontal siding piece. Unfortunately, the generic specifications set out in the Building Code unintentionally exclude several common vinyl siding profiles, and some local jurisdictions have taken a very narrow interpretation. However, the unintended consequence is that some vinyl siding profiles do not meet the requirements as spelled out.

The ambiguity has led the BC Building Policy Branch in the Office of Housing and Construction Standards to issue a bulletin stating that all vinyl siding profiles provide an acceptable cladding product that meets the new requirements for rain screen cladding. Open back vinyl (and aluminium) siding can be used in the coastal climate in the conventional manner without strapping or other means of providing a drained and vented air space (capillary break) behind it.

Required Landings (9.8.6.2.)

The building code requires that a landing is required at the top and bottom of each flight of stairs. One interpretation of the code language would suggest that the code requires a landing (top and bottom) in a garage where the vertical rise from the garage slab to the interior of the home exceeds one riser. Adding such a landing

Canadian Home Builders' Association

The Technical Research Committee (TRC) is the industry's forum for the exchange of information on research and development in the housing sector.
Canadian Home Builders' Association, Suite 500, 150 Laurier Ave. West, Ottawa, Ont. K1P 5J4
Tel: (613) 230-3060
Fax: (613) 232-8214
e-mail: chba@chba.ca
www.chba.ca

would likely make a garage incapable of holding a car in a standard sized single car garage, or a second vehicle in a double garage.

Erroneous interpretations have been made by some building officials in BC and Ontario. However, the 2006 Building Code (as was the case in the 1997 Building Code) does not require a landing between a door and the top of a stair in a garage in a dwelling unit, provided the door swings away from the stair.

The Ontario Ministry of Municipal Affairs and Housing has already issued an interpretive letter explaining this. In BC, a bulletin explaining this is being prepared.

The BC Building Code will be formally amended (with an effective date of April 15, 2007) to clarify these interpretations.

Foil-Faced Rigid Insulation

Foil-faced materials have long been touted as a miracle insulation. Outlandish claims have been made for the reflective insulation products. Some puffery and exaggeration can be expected at trade shows. When unrealistic claims are made forcefully, many will assume there must be credible backing to support such a claim and may accept the claims. Often, the claims are only supported by anecdotal testimonials which do not present a fair performance assessment.

Radiant barrier manufacturers often test their products under unique test protocols, different from that of other products, and then compare their products against the others. The challenge is to understand the appropriate conditions under which reflective products provide benefits and to understand where it is appropriate to use them.

A design professional recently encountered a representative of the P2000 Insulation System making claims of R-14 or more for a slim 3/8" thick foil-faced Type 1 expanded polystyrene board (EPS) insulation at a home show, and expressed concerns about the misleading messages being sent out. Even Thermax, which is a foil-faced foam board, only claims an R 6.6/inch thickness but it is made of polyisocyanurate, not EPS.

We commented on this product and the exaggerated claims being made for it in Solplan Review No 125 (November 2005). Recently, we received another letter from a design professional in Saskatchewan. We thought it would be appropriate to bring this to the attention of our readers once more.

The long-term thermal resistance that can be expected from 1" of EPS insulation is R-3.75 to R-4 (depending on product density). Foil facing has some effect as a radiant barrier, but little influence on conductive heat loss. Even a test done for the manufacturer in accordance with standard ASTM testing procedures (and posted on their website), shows that a wall assembly with an empty stud cavity and a 3/8" P2000 panels has a total thermal resistance of only R-5.2.

The CCMC listing for this product is for an Expanded Polystyrene Insulation Board so the applicable properties are the same as for other EPS products without credit for the foil facing.

The P2000 website is careful not to state in writing the exact R-value per inch, although they imply that their product outperforms 6" of batt insulation. As our correspondent wrote, "face-to-face, I was assured that I could achieve R-values of R-24 per inch or higher and that this was certified by InterTek, a reputable independent testing agency." Intertek has been on record that they have not made such claims and have expressed concerns that some of their test results have been misquoted.

As professionals, we work hard to educate clients about what they can and cannot achieve with insulation products. It is unfortunate to see some salespeople make unreasonable claims about their products. Exaggerated or fraudulent claims undermine public confidence in our industry as a whole.

Products such as P2000 do have their place in our industry, but exaggerated claims should be avoided.

EnerChoice Stamp of Approval

Fireplaces can be relied on to warm up a cool room, as well as add the beauty of fire to daily life, and increase the value of a home. So when a gas fireplace is being selected, consider how it might be used. Will it be primarily a decorative appliance to provide atmosphere or also be a heating appliance? If the unit will be acting as a heating appliance, its efficiency is important.

All hearth products are required to be tested to the proper Canadian standards and must have the EnerGuide efficiency rating on display. The EnerGuide ratings for hearth products were established by the Canadian government in consultation with the hearth industry. This uniquely Canadian rating system provides consumers with a clear indication of the unit's efficiency, which in turn lets you know whether the fireplace is designed primarily for decorative purposes or for heating purposes. The higher the number, the more efficient the appliance.

The BC Government has mandated as part of the energy efficiency regulations, that effective January 1, 2007 all gas-fired fireplaces sold in BC must be tested and rated. A label indicating the fireplace efficiency rating (FE) must be affixed to the unit so that it is readily visible. Once installed and commissioned, it can be removed.

The Hearth Patio & Barbecue Association of Canada (HPBAC) has now launched ***EnerChoice***, a certification program for higher efficiency gas fireplaces, freestanding stoves and inserts. The ***EnerChoice*** stamp of approval is reserved for products that meet or exceed minimum energy efficiency levels as determined by an independent committee managed by the HPBAC.

EnerChoice can only be applied to:

- Free-standing stoves whose energy efficiency ratings meet or exceed 66%,
- Fireplaces whose energy efficiency ratings meet or exceed 62.4%, and
- Fireplace inserts whose energy efficiency ratings meet or exceed 61%.

(Gas logs do not have an EnerGuide number and therefore are treated as "0%").

- ***EnerChoice*** is a unique endorsement reserved for those fireplaces that are considered 'most heat efficient' in their category (as determined by a joint government, utility and industry committee).
- The categories include fireplaces, fireplace inserts or free standing appliances.
- The EnerGuide label provides an FE number – the higher the number, the greater the efficiency. This is a comparative tool and allows one to compare one appliance to another.
- Higher-efficiency equipment may cost a bit more but it saves money and energy in the long run. The actual savings depend on local climate, the cost of fuel, the efficiency of the appliance and the efficiency of the dwelling itself.
- Every make and model has an EnerGuide rating except for fireplaces using gas logs.

To learn more about EnerGuide efficiency ratings and product listings, Natural Resources Canada: *www.nrcan.gc.ca*.

Solplan Review Back issues

A limited number of back issues are available, at a special price of $5.75 each (plus 6% GST).

Bundle special: a random selection of back issues (minimum 22 copies) are available for only $65.00 (plus 6% GST)

Solplan Review
Box 86627
North Vancouver, BC V7L 4L2
e-mail: solplan@shaw.ca

energy efficient, sustainable, and healthy buildings
design & consulting services
R-2000 File Management
HOT-2000 Analysis
SuperE™ House Program Design Professional

Richard Kadulski Architect

#204 - 1037 West Broadway
Vancouver, B.C. V6H 1E3
Tel: (604) 689-1841
Fax: (604) 689-1841
e-mail: kadulski@direct.ca

Energy Answers

Rob Dumont

What is the best angle to tilt a solar collector for a house in Canada?

The best orientation is usually due south, and the best tilt angle is usually equal to the latitude of the location.

The latitude angles for centres across Canada are listed in the table.

City	Latitude
Windsor	42° N
Toronto	44° N
Ottawa	45° N
Montreal	45° N
St. John's	47° N
Fredericton	48° N
Vancouver	49° N
Regina	50° N
Winnipeg	50° N
Calgary	51° N
Saskatoon	52° N
Edmonton	54° N
Yellowknife	62° N
Iqaluit	64° N
Inuvik	69° N

The sun is relatively forgiving, however, and one can vary the tilt angle as much as 20 to 30 degrees and suffer few penalties.

Figure 1 shows the effect of tilt angle on the measured annual solar radiation in Regina for 4 different tilt angles.

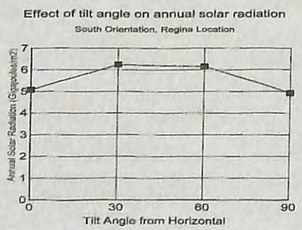


Figure 1. Effect of tilt angle on annual solar radiation, Regina

Of the four tilt angles, the 30-degree tilt yields the highest annual solar radiation at 6.24 Gigajoules per square meter. At 60 degrees, the value is 6.16 GJ/square meter. Thus there is very little penalty to varying from the optimum of 50 degrees. Even at a tilt angle of 90 degrees, the annual value stays relatively high at 4.93 GJ/square meter.

The Factor 9 home in Regina (*www.factor9.ca*) is using solar panels that are at 90 degrees. A picture of the solar panels on the south side of the house is shown in Figure 2.

Figure 2. View of the Factor 9 Home from the southwest. The solar thermal panels are in a horizontal band five feet high at the mid-height of the south wall.

In areas with frequent snowfall, it is desirable to have a large tilt angle on the collectors to allow the snow to readily slide off by gravity. In my own house in Saskatoon, the solar panels are at a 70-degree tilt angle and occasionally in winter they will not shed the snow. This is usually not a big problem, as the snow will usually melt off once the sun comes out for a few days. A picture of the south side of my house is shown in Figure 3.

Many new houses have a roof pitch of 4/12 (rise/run), which converts to an angle of 18 degrees from the horizontal. At that low angle, the snow will not readily fall off by gravity, as shown in Figure 3.

Another consideration for the optimum tilt angle is the use to which the solar energy will be put. A solar thermal collector for space heating needs most of the energy in the winter. On my house I tilted the collectors at 70 degrees to favour the winter sun. In the summer I have more than enough for domestic water heating, even at the relatively steep tilt angle.

In summary, solar collectors should face due south with a tilt angle to the horizontal approximately equal to the latitude. Go for a steeper angle if winter collection is desired. ☼

Figure 3. View from the south of the Dumont House. The solar panels are at a tilt angle of 70 degrees from the horizontal. Note how the snow remains on the cedar shingles of the 4/12 pitch roof.

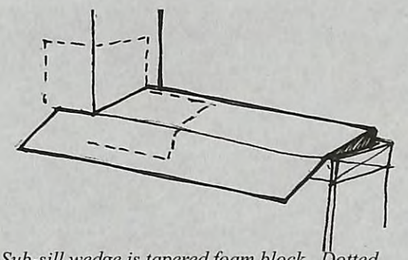
Window Installation Aids: Beveled Window Seal

Best practice guides for window installations recommend that window sill rough openings be sloped outward. On many larger, multi-family projects on the West Coast, the building envelope consultants are insisting that the window installations be done with sloped sills, which requires extra effort at the framing stage to properly size and trim the rough opening to allow for the slope.

Some manufacturers are beginning to produce sloped products that can simplify installation and avoid the need to trim framing on site. A Calgary company, Building Envelope Consultants Ltd. has developed a window installation system that includes a preformed sloped sub-sill.

Their system features an elastomeric sealant used over the window flanges known as Envelopesealant™ as part of a moisture management system for windows. It has been in use in Alberta for the past few years and is permitted to be used as a part of the moisture management system on the exterior walls of a building in Alberta when combined with approved building paper as described in Alberta Building Code 9.23.17.1 (material standard sheathing membrane, breather type).

We have reservations about the use of the elastomeric sealant in the manner the manufacturer is promoting it because it essentially relies on a face-sealed window installation. It is a system many building envelope consultants in Vancouver would not accept. However, in some climate zones, it may function well, and it seems to address some window installation issues that exist in the Alberta market



Sub-sill wedge is tapered foam block. Dotted line indicates corner piece of membrane flashing required to provide a continuous membrane at the corner, prior to installation of window.

However, we are more interested in the sub-sill product. This is a tapered foam strip, 3 ½" wide, ¾" thick at the thickest point, and it is covered with an impermeable sheathing membrane which laps over the wall framing. This piece is sold by the length and still requires appropriate installation practices to wrap a membrane up the jamb, but it does provide the taper which is beneficial for window sills.

BEC Window & Envelope Consulting Ltd.
Calgary, Alberta
Tel. 403.259.4411
Fax. 403.259.4466

NRC·CNRC

A Summary of NRC-IRC Housing Activities for 2006

By John Burrows and Jim Gallagher

This article presents highlights from the NRC-IRC housing activities report prepared for the 2007 annual conference of the Canadian Home Builders' Association.

Building Envelope and Structure

Hygrothermal Performance of Wall Assemblies: Significant upgrades to the NRC-IRC two-storey research house have greatly enhanced the Institute's capability to carry out both building envelope and indoor environment research, particularly for heating and ventilation systems. This will enable more emphasis on projects regarding the "house as a system."

A new test bay allows wall specimens to be studied for heat, air and moisture transfer under natural outdoor conditions and controlled indoor conditions. In 2006, three identical 2 x 6 wood-frame wall test sections were installed and are being tested to validate the facility and to examine condensation potential in different layers of the walls against increased indoor relative humidity and air exfiltration levels. The upgraded test house is also being used to test hybrid heating and ventilation systems as reported in the July and September 2006 issues of Solplan Review.

Window/Wall Interface Details for Managing Rainwater: In this ongoing project, there have been some initial findings regarding the rough window opening, which must be properly designed and flashed to ensure water tightness at the sill. A number of preliminary reports from the project are available. Upon project completion, CMHC will incorporate the results into a best practice guide for window installation for both low-rise wood-frame construction and high-rise residential.

Building Envelopes for Northern Construction: The goal of this project is to develop guidelines to improve the energy efficiency and durability of building envelopes for the extreme conditions of Canada's North. Following a review of current technologies and practices for heating, ventilation, moisture management and energy use, researchers have completed field surveys of eight houses in each of three different northern centres to capture concurrent temperature, relative humidity, and air tightness data. The researchers are now consulting with the northern communities on the selection of wall systems to be studied and will initiate the experimental and modeling work.

Indoor Environment

Mould Research: NRC-IRC has initiated a comprehensive project to address mould growth in buildings. The first phase will develop mould detection techniques for residential and office buildings, including procedures for hidden cavities. The second phase will identify building products with improved resistance against mould infestation. The project will culminate in the development of a computer model capable of predicting mould growth in buildings based on building assembly, weather conditions, and indoor situations such as varying occupancy and use.

Desiccant Evaporative Cooling System for Residential Buildings: The use of air-conditioning in Canadian residential buildings has grown significantly in recent years. This project will investigate the use of desiccant-based air-conditioning to improve energy efficiency. Field trials will compare the relative performance of conventional air-conditioning and desiccant-based cooling systems for energy consumption and humidity management.

Sound and Fire Performance of Fire Stops: NRC-IRC researchers, with input from industry, are completing a comprehensive guide on the sound and fire performance of fire stop systems. The guide will be available later in 2007.

Fire Safety

Fire Performance of Houses: This project is examining the impact of new construction products and systems on the fire safety of single-family dwellings. Based on an established "fuel package" for a basement fire and full-scale fire experiments, the effects of fuel quantity, ventilation and other parameters have been determined for fire growth in unprotected basements for specific fire scenarios. The results will be used to establish the timeline of fire initiation, smoke alarm activation, and time at which structural failure occurs.

Characteristics of House Fires: NRC-IRC has launched a new project to study the characteristics of fires in living rooms, bedrooms and kitchens in low-rise, light-frame, multi-suite residential dwellings by using computer simulations and full-scale fire experiments in realistically furnished rooms. This research will provide a comprehensive analysis of fire characteristics in various areas within multi-suite residential dwellings. The design fires and calculation methods will be used in the development of design guides, codes and standards.

CCMC Evaluations

CCMC Evaluation of Rim Boards: In engineered wood floor construction, the rim board transfers vertical loads from one floor to another, rather than through the floor joists. There are now many rim boards available ranging in composition, thickness and configuration, and it is becoming more complex to ensure that a rim board is adequate for a given application. The technical information provided in the CCMC Evaluation of Rim Boards assists in this decision-making.

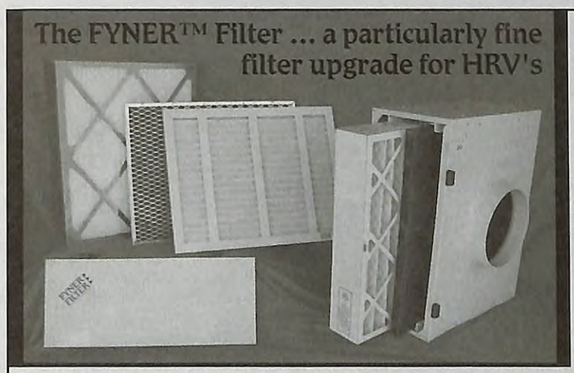
Evaluation of Spray Urethane Foam and Open-Cell Foams: Medium-density (rigid) spray urethane foam has been evaluated by CCMC since the product's re-entry into the marketplace in 1992. To simplify this process, CCMC has established a committee to develop a listing program rather than a lengthy evaluation report and plans to have a new ULC standard published in time for adoption in the 2010 NBC.

EIFS Cladding on Wood Substrates: EIFS (exterior insulation and finish systems) have been gaining a larger share of the construction market. Past CCMC evaluations were limited to substrates such as brick, masonry, and concrete walls that were all considered insensitive to moisture. With the entry of EIFS having OSB and plywood substrates to the residential market, CCMC has begun issuing evaluation reports for these new products.

The complete housing activities report is available on the NRC-IRC Web site at: *http://irc.nrc-cnrc.gc.ca/pubs/fulltext/nrcc49233/*

John Burrows is an Ottawa-based consultant and technical writer. Jim Gallagher is Manager of Publication Services at NRC-IRC.

The FYNER™ Filter ... a particularly fine filter upgrade for HRV's



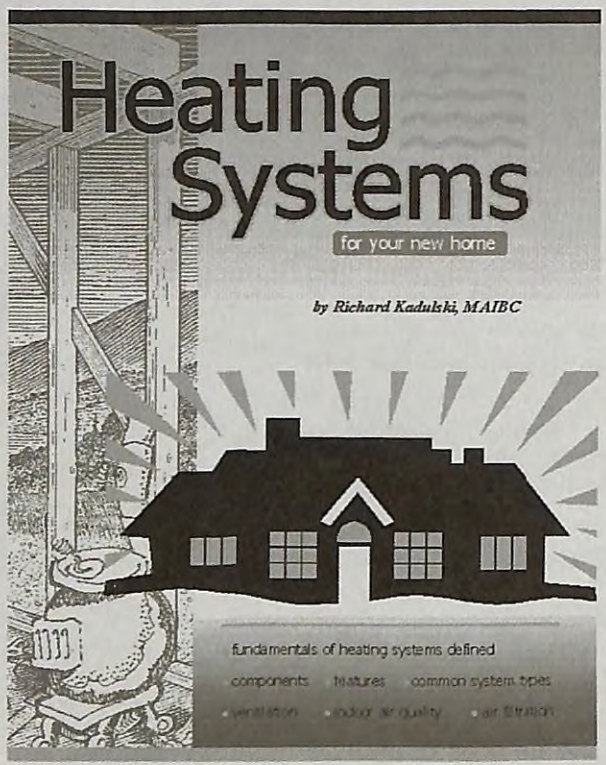
With an HRV, The FYNER™ Filter needs no boost fan and uses little additional energy.

Mounting Options:
- *vertical,*
- *horizontal, or*
- *reverse flow*

Collar Options:
- *6"Ø, 8"Ø or 12"Ø*

The FYNER™ Filter cabinet holds one 16"x 20"x 4" Particle Filter, and one optional 16"x 20"x 1" filter:
- *a Pleated Pre-Filter, or*
- *a 1.5 lb. Odour Control Filter, or*
- *a 5.5 lb. Odour Control Filter*

ENEREADY PRODUCTS LTD.
#4 - 6420 Beresford Street • Burnaby • British Columbia CANADA • V5E 1B6
Telephone: 604-433-5697 • Fax: 604-438-8906 • www.enereadyproducts.com



$19.95 Mail order: $ 23.79 ($19.95 + plus $ 2.50 shipping & handling + GST)

Available Now!

Heating Systems
for your new home
by Richard Kadulski, MAIBC

Heating Systems for Your New Home is the book that explains heating system options for your new home.

Contents include:

- **Heating Fundamentals**
- **Heating System Types**
- **Features to consider**
- **Common system types described**
- **Overview of ventilation**
- **Filtration**
- And much more!

the drawing-room graphic services ltd.
Box 86627 North Vancouver, B.C. V7L 4L2
FAX (604) 689-1841
e-mail: solplan@shaw.ca

SOLPLAN REVIEW is an independent Canadian Journal published 6 times per year to serve the needs of professionals and interested lay persons. It provides news, technical details, new product information, insights and commentary on developments covering all aspects of building science and energy efficient building practice for new and retrofit residential construction. Technical information is presented in a clear, concise manner without resorting to jargon.

SOLPLAN REVIEW is an independent subscription supported publication that relies on the support of readers. If you are seeing this journal for the first time, and find it valuable, why not ensure that you don't miss any copies. Subscribe today!

YES, I WANT TO SUBSCRIBE TO SOLPLAN REVIEW

In Canada: 1 year: $51.94 ($49.00 + 2.94) [NB, NS, NL $55.86 includes HST]

2 years: $93.28 ($88.00 + 5.28) [NB, NS, NL $100.32 includes HST]

USA and other foreign: 1 year $56.00 per year, 2 years $102.00 (USA and other foreign in US funds).

Pay by: VISA ☐ MASTERCARD ☐ AMERICAN EXPRESS ☐ CHEQUE/CHECK ☐

Card No _____ Exp date _____

Signature _____

NAME _____

ADDRESS _____

_____

POST CODE _____

the drawing-room graphis services ltd.
PO Box 86627 North Vancouver, BC V7L 4L2
Fax: 604-689-1841
e-mail: solplan@shaw.ca

GST registration: R105208805